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10/566,408	01/26/2006	Masaki Higurashi	IPO-P1965	5715

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EXAMINER	
ENTEZARI, MICHELLE M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/566,408	Applicant(s) HIGURASHI ET AL.	
	Examiner MICHELLE ENTEZARI	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 17, 2009 has been entered.

Response to Amendment

2. Claims 1 and 3-10 are pending. Claims 14-52 have been withdrawn. Claims 2 and 11-13 have been canceled. Claims 1 and by dependency 3-10 have been amended.

Response to Arguments

3. Applicant's arguments filed December 17, 2009 have been fully considered but they are not persuasive. Regarding the argument that Song et al. do not teach "calculating an input range for distortion correcting processing on a next block image

data concurrently during executing the distortion correcting processing on the block of image data preceding said next block of image data", examiner disagrees. Song et al. in addition to the prior cited,

"Meanwhile, the keystone distortion parameter is not obtained by one time. Thus, the keystone distortion parameter is successively updated to be converged to an accurate distortion parameter. In other words, a distortion is corrected by inverse-transformation by using an obtained distortion parameter, and a coordinate is extracted to obtain a new distortion pararrieter, based on which the previously obtained distortion parameter value is varied. This process is repeatedly performed until an accurate keystone distortion parameter is obtained"([0111]),

Which implies affecting the next distortion processing, also teach,

"First, in a method for generating distortion correction information, since the image displayed on the screen of the projection TV is a keystone distortion and a pincushion distortion combined image, in a state that one distortion is completely corrected, the other distortion correction information is obtained with reference to FIG. 5A, or with reference to FIG. 5B, the two kinds of distortions are <u>simultaneously</u> corrected, and at the <u>same time,</u> the two distortion correction information are updated, to finally obtain two distortion correction information" ([0048])

And also,

"That is, the controller 24-2 interpolates the frame data stored in the first frame memory 24-1 on the basis of the distortion correction information stored in the distortion correcting memory 24-4 on a real time basis and keystone-prewarps it as shown in FIG. 12C, and at the <u>same time,</u> stores a prewarped-image frame data generated according to pincushion prewarping in the second frame memory 24-3 (S32)" ([0160]).

These paragraphs contain the *teachings* of calculating for distortion correcting processing on a next block image data, as well as the concept of performing functions concurrently during executing the distortion correcting processing on the block of image data preceding said next block of image data.

4. Regarding the argument on page 17 that Song does not teach dividing an image into blocks, this feature was taught by Nako.

5. Regarding the argument on page 17 that Nako does not teach range processing, this is taught by Gallagher.

6. Other claims are argued by dependency and are addressed by the above.

7. Examiner recommends either further amendment, or possibly, an explanation that the combination would work together in a predictable way as examiner would anticipate, examiner suggests submitting the reasoning for this.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims 1, 3, 4, and 5 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher (US 2003/0215230 A1) in view of Suda (US 20020122124 A1) in view of Nako (US 5940544 A) in view of Song (US 20020164083 A1).

Regarding claim 1, Gallagher discloses an image processing apparatus (imaging system, [0009], shown with CPU in fig. 4) comprising a distortion correcting unit (system for correcting distortion, [0010], processor, [0039]), the image processing apparatus

further comprising a distortion correcting range calculating unit that calculates an input image range (preferably output image has same number of rows and columns as input image, if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default value, [0027]; distortion model governs the mapping of locations of the output image to locations in the input image, [0028], [formula to find xo, yo, included in [0028]]; since value is set to a default if it falls outside of a given range, it indicates the range is being determined). Gallagher further discloses the distortion correcting range calculating unit comprises: a coordinate generating unit that generates interpolation coordinates (the value of the pixel o(mo, no) [coordinate] is determined by interpolating the value from the pixel values nearby i(xo, yo), [0027]); a distortion-correction coordinate transforming unit (output image is generated by the distortion corrector, [0027], distortion model to map output image locations (m, n) to locations x, y of input image, [0028]); and a correcting range detecting unit that calculates input image range from the transformed coordinate position (preferably output image has same number of rows and columns as input image, if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default value, [0027]; distortion model governs the mapping of locations of the output image to locations in the input image, [0028], [formula to find xo, yo, included in [0028]] since value is set to a default if it falls outside of a given range, it indicates the range is being determined).

Gallagher does not explicitly disclose the input image range for distortion correction processing performed by the distortion correcting unit. However, as a distortion model

governs the mapping of locations of the output image to locations in the input image ([0028], [formula to find xo, yo, included in [0028]]), and a matching is occurring between the range of coordinates of the input and output image (if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default value, [0027]; since value is set to a default if it falls outside of a given range, it indicates the range is being determined), it would be obvious at the time of the invention to one of ordinary skill in the art that in finding this input image range, and the input image is corrected for distortion, the distortion correction range is also being determined.

Gallagher also does not explicitly disclose a distortion-correction coordinate transforming unit that outputs a coordinate transformed by applying a predetermined distortion correcting formula to the generated interpolation coordinate, or sequentially performing distortion correction processing in units of block image data obtained by dividing an image data, or wherein the distortion correction range calculating unit calculates the input image range for distortion correcting processing on a next block of image data concurrently with execution of the distortion correcting processing of a block of image data preceding said next block of image data b the distortion correcting unit.

Suda teaches a distortion-correction coordinate transforming unit that outputs a coordinate transformed by applying a predetermined distortion correcting formula to the generated interpolation coordinate (interpolation to correct misregistration, [0130]; subsequent distortion correction, [0131]).

Gallagher and Suda are in the similar art of correcting image distortion (Gallagher, title, Suda, [0131], [0136]). It would have been obvious at the time of the invention to one of ordinary skill in the art to substitute the sequential interpolation and distortion correction as taught by Suda for the distortion correction that is also interpolation as taught by Gallagher, because when taking images with a photographing lens, Suda states the reason this interpolation is done before distortion correction, is that due to shifts of object images caused by expansion or shrinkage of the photographing lens, the direction of misregistration has deviated from that parallel to the plane of the paper after distortion correction, and interpolation cannot be implemented by simple arithmetic ([0136]).

Gallagher and Suda do not explicitly disclose sequentially performing distortion correction processing in units of block image data obtained by dividing an image data, or wherein the distortion correction range calculating unit calculates the input image range for distortion correcting processing on a next block of image data concurrently with execution of the distortion correcting processing of a block of image data preceding said next block of image data b the distortion correcting unit.

Nako teaches sequentially performing distortion correction processing in units of block image data obtained by dividing an image data, as Nako teaches subdividing the picture into multiple blocks (col. 13, lines 60-65) and then performing distortion correction by

enlarging the picture (col. 14, lines 15-20), wherein the magnification is done with respect to each column of pixels (col. 14, lines 35-40), and where the column dependent processing is executed with respect to a series of pixels as a unit, which pixels are aligned with a specific direction, in the direction of picture correction (col. 18, lines 25-35).

Gallagher, Suda, and Nako are in the similar art of distortion correction (Gallagher, title, Suda, [0131], [0136], Nako, title). It would have been obvious at the time of the invention to one of ordinary skill in the art to process blocks before correction as taught by Nako with the invention of Gallagher and Suda, as this would be one of a limited number of ways to process data, would have been obvious to try, and by processing blocks would have a predictable time savings.

Gallagher and Suda and Nako do not explicitly disclose the distortion correction range calculating unit calculates the input image range for distortion correcting processing on a next block of image data concurrently with execution of the distortion correcting processing of a block of image data preceding said next block of image data b the distortion correcting unit.

Song teaches the keystone distortion parameter is successively updated to be converged to an accurate distortion parameter([0111]), which implies affecting the next distortion processing, also teach, in a state that one distortion is completely corrected,

the other distortion correction information is obtained, the two kinds of distortions are simultaneously corrected, and at the same time, the two distortion correction information are updated, to finally obtain two distortion correction information ([0048]), and also, the controller interpolates the frame data stored in the first frame memory on the basis of the distortion correction information stored in the distortion correcting memory on a real time basis and keystone-prewarps it, and at the same time, stores a prewarped-image frame data generated according to pincushion prewarping in the second frame memory ([0160]).These paragraphs contain the *teachings* of calculating for distortion correcting processing on a next block image data, as well as the concept of performing functions concurrently during executing the distortion correcting processing on the block of image data preceding said next block of image data.

Gallagher, Suda, Nako, and Song are in the similar art of correcting image distortion (Gallagher, title, Suda, [0131], [0136], Nako, title, Song, title). It would have been obvious at the time of the invention to one of ordinary skill in the art to use the *teachings* of calculating for distortion correcting processing on a next block image data, as well as the concept of performing functions concurrently during executing the distortion correcting processing on the block of image data preceding said next block of image data, such as that taught by Song, with the apparatus disclosed by Gallagher and Suda and Nako, as video data is a common application for image analysis, and as this concurrent processing would be more time efficient.

Regarding claim 3, Gallagher and Suda and Nako and Song disclose the image processing apparatus according to claim 1. Nako teaches a height calculation section calculates from the edge a height of the document, and subsequently a distortion correction section corrects a distortion by magnification/reduction of the picture rotated by the rotation correction section on the basis of the document height and the magnification (abstract). This indicates the correction is being performed based on the edges.

Though Nako does not explicitly teach using only these pixels on the edges exclusively, in the explanation that these peripheral pixels are the pixels causing these major distortions when imaging books, it would have been obvious at the time of the invention to one of ordinary skill in the art to use these pixels exclusively in the mapping, as this would reduce computation time.

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the rectangular input image and using only coordinates regarding the sides with the invention of Gallagher and Suda and Nako and Song because as taught by Nako, skew can be detected based on the edges (abstract).

Regarding claim 4, Gallagher, Suda, and Nako and Song disclose the image processing apparatus according to claim 3.

Nako further teaches a rectangular paper (col. 8, lines 65-68), in which a height calculation section calculates from the edge a height of the document, and subsequently a distortion correction section corrects a distortion by magnification/reduction of the picture rotated by the rotation correction section on the basis of the document height and the magnification (abstract). This indicates the correction is being performed based on the edges.

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the rectangular input image with the invention of Gallagher and Suda and and Song, because as taught by Nako, in the case of determining skew in order to correct distortion in documents, the start image from which these skew values are being derived from will generally be rectangular (col. 8, lines 65-68).

Regarding claim 5, Gallagher, Suda, and Nako disclose the image processing apparatus according to claim 4.

Nako further teaches selecting an appropriate processing area in accordance with the skew (col. 5, lines 35-40), wherein a skew detection means determines a maximal and minimal point from among the edges to detect the skew angle (col. 5, lines 50-55). Because the processing range is changed in accordance with skew, and skew is determined using the maximum and minimum of the sides (edges), this shows the

range calculation in this instance is based on maximum and minimum values of the coordinates of the pixels corresponding to the four sides of the output image range.

Regarding claim 6, Gallagher and Suda and Nako and Song disclose the image processing apparatus according to claim 1. Song further teaches a controller for interpolating the image stored in the first frame memory on a real time basis and prewarping it by using the distortion correction information stored in the distortion correcting memory, ([0151], [0160]). Examiner interprets acting on the images in real-time as indicative of performing a calculation on time-series data.

Gallagher, Suda, Nako, and Song are in the similar art of correcting image distortion (Gallagher, title, Suda, [0131], [0136], Nako, title, Song, title). It would have been obvious at the time of the invention to one of ordinary skill in the art to use the transforming unit on a time series, such as that taught by Song, with the apparatus disclosed by Gallagher and Suda and Nako, as video data is a common application for image analysis which would require processing multiple frames over a span of time.

Regarding claim 8, Gallagher and Suda and Nako and Song disclose the image processing apparatus according to claim 1. Song et al. teach coordinates are successively updated based on which a distortion is corrected, and the process is repeatedly performed until the size of a scaled-up or scaled-down image is determined suitable to the screen ([0144]), and indicate multiple images ([0151], [0160]).

It would have been obvious at the time of the invention to one of ordinary skill in the art to use successive updating based on multiple images, such as that taught by Song, with the apparatus disclosed by Gallagher Suda and Nako, as this will help refine the processing for a variety of images with mildly varying distortion as would be found in video.

Regarding claim 9, Gallagher and Suda and Nako and Song disclose the image processing apparatus according to claim 1. Song et al. further teach coordinates are successively updated based on which a distortion is corrected, and the process is repeatedly performed until the size of a scaled-up or scaled-down image is determined suitable to the screen ([0144]).

Regarding claim 10, Gallagher and Suda and Nako and Song et al. disclose the image processing apparatus according to claim 8. Song et al. further teaches a range calculation is performed repeatedly, and a correcting magnification M is determined such that an image range after distortion correction processing comes within a predetermined range with respect to the input image range (coordinates are successively updated based on which a distortion is corrected, and the process is repeatedly performed until the size of a scaled-up or scaled-down image is determined suitable to the screen, [0144]).

10. **Claim 7 is** rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher (US 2003/0215230 A1) and Suda (US 20020122124 A1) and Nako (US 5940544 A) and Song (US 20020164083 A1) as applied to claim 1 above, further in view of Suzuki et al. (US 6801671 B1).

Regarding claim 7, Gallagher and Suda and Nako and Song disclose the image processing apparatus according to claim 1.

Gallagher and Suda and Nako and Song do not explicitly disclose the coordinate generating unit obtains coordinates by performing predetermined thinning-out processing with respect to the interpolation coordinates for distortion correction processing.

Suzuki et al. teach, "In the case of reduction, in order to prevent such processing from causing a deterioration in image quality, after interpolation of the pixel data is carried out by the reducing interpolation unit in accordance with the reduction ratio, the interpolated pixel data is thinned out by the reduction/enlargement unit and the image is reduced", (col. 1, lines 45-55).

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the thinning out as taught by Suzuki et al. with the invention of Gallagher and Suda and Nako, as this is described by Suzuki et al. as part of conventional

magnification processing (col. 1, lines 55-65), therefore this would have been a known way to perform this and would have predictable results.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE ENTEZARI whose telephone number is (571)270-5084. The examiner can normally be reached on M-Th, 7:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571)272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michelle Entezari/
Examiner, Art Unit 2624

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